CLAIMS

What is claimed is:

1. An integrated circuit based detection system, comprising:

a plurality of probe microarrays, each of said microarrays having a plurality of receptor probe elements for combining with at least one target molecule;

a source of electromagnetic radiation, said probe elements generating an identifiable signal when combined with said target molecule in response to said electromagnetic radiation;

structure for translating said plurality of microarrays, wherein said microarrays are replaceable by others of said plurality of microarrays, and

an integrated circuit microchip including a plurality of detection channels to which said probe elements are brought into optical alignment for sensing the presence of said target molecule based on said signal.

2. The system of claim 1, wherein at least one of said microarrays comprise at least one protein probe and at least one nucleic acid probe.

3. The system of claim 1, wherein said microarrays comprise at least two probes selected from the group consisting of DNA, RNA, antibodies, proteins, enzymes, cells or cell components, and biomimetics.

4. The system of claim 3, wherein said biomimetics are at least one selected from the group consisting of molecular imprint antibodies, DNA-based aptamers, PNA, cyclodextrins and dendrimers.

5. The system of claim 1, further comprising an air sampler for collecting airborne samples.

6. The system of claim 1, wherein said system comprises a sample concentrator.

7. The system of claim 6, wherein said sample concentrator comprises a flow injection analysis system.

8. The system of claim 7, wherein said flow injection analysis system comprises a plurality of microparticles coated with bioreceptors, said coated microparticles mixed with a sample at said sample concentrator.

9. The system of claim 8, wherein said concentrator includes a size exclusion device for eliminating substances not trapped onto said coated microparticles.

10. The system of claim 1, wherein said system further comprises a biofluidics system having a plurality of microfluidic channels, said biofluidics system for directing samples through said microfluidic channels to said microarrays.

11. The system of claim 1, wherein said plurality of microarrays are provided on a translatable tape.

12. The system of claim 11, wherein said system further comprises structure for translating said tape.

13. The system of claim 1, wherein said microarrays are provided on a rotable disk.

14. The system of claim 1, wherein said integrated circuit microchip provides a separate detector channels for each of said receptor probes on said microarrays.

15. The system of claim 14, wherein detectors for said detector channels are selected from the group consisting of photodiodes and phototransistors.

16. The system of claim 1, wherein a continuous tape having said plurality of miccroarrays provides sample collection and processing.

17. The system of claim 1, further comprising a target amplification system.

18. The system of claim 17, wherein said target amplification system comprises at least one selected from the group consisting of a PCR, SDA, ELISA and immuno-PCR.

19. The system of claim 1, further comprising a lysis system.

20. The system of claim 1, further comprising an audio or visual display to indicate the presence of said target molecule.

21. The system of claim 20, further comprising structure for attaching said system to an individual.

√

22. A method of detecting target analytes, comprising the steps of:

providing a plurality of probe microarrays, each of said microarrays having a plurality of probe elements for combining with at least one target molecule, wherein said probe elements generate an identifiable signal when combined with said target molecule in response to electromagnetic radiation;

exposing probe elements on a first of said plurality of microarrays to a sample suspected of containing said target;

irradiating said first microarray with electromagnetic radiation;

determining whether said target is present;

automatically replacing said first microarray with another of said plurality of microarrays, and

repeating said exposing, irradiating and said determining step with said another of said plurality of microarrays.

23. The method of claim 22, wherein at least one of said microarrays comprise at least one protein probe and at least one nucleic acid probe.

24. The method of claim 22, further comprising the step of concentrating said sample.

25. The method of claim 24, wherein said sample concentrating comprises mixing a plurality of microparticles coated with a bioreceptors with said sample.

26. The method of claim 25, further comprising the step of removing substances not trapped onto said coated microparticles.

27. The method of claim 22, wherein said plurality of microarrays are provided on a translatable tape or a rotatable disk.

28. The method of claim 27, further comprising the step of translating said tape or rotating said rotatable disk.

29. The method of claim 22, wherein a continuous tape having said plurality of miccroarrays provides collection and processing for said sample.

30. The method of claim 22, further comprising the step of amplifying a concentration of said target.

31. The method of claim 30, wherein said target is a non-DNA target and said amplification comprises ELISA.

32. The method of claim 22, further comprising the step of lysing said sample.

33. The method of claim 22, further comprising the step of generating an audio or visual alarm to indicate the presence of said target.